Female Nudity, Arousal, and Ad Response: An Experimental Investigation

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The present study uses a causal-modeling approach to evaluate an experimental manipulation of female nudity in print advertising. A hypothetical model which includes a multi-dimensional structure of arousal acting as an intervening factor between the ad nudity stimulus and resulting cognitive impressions of the ad is proposed. The results lend particular insight into the complex underpinnings of the psychophysiological response to female nudity in advertising. Important theoretical implications and future research directions are discussed.

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Though still controversial, female nudity and erotic content have become almost commonplace in contemporary advertising. Over the past two decades, sexual illustrations have become more overt; ads today rely more on visual sex, and female models are more likely than in years past to be partly clothed or nude (Soley and Kurzbard 1986; Soley and Reid 1988; Tinkham and Reid 1988). Although advertisers have intensified the use of erotic appeals in communications, the effects of such appeals are poorly understood and may often be counterproductive. Alexander and Judd (1986) conclude that while sex and female nudity in advertising are neither uniformly liked or disliked, advertisers must know their markets and ensure that the appeal used will not arouse unfavorable feelings toward the product. This paper evaluates the ability of the arousal construct to explain many of the individual, content, and situational differences in responses to female nudity in advertising (Alexander and Judd 1986; LaTour 1990; Morrison and Sherman 1972; Richmond and Hartman 1982; Sciglimpaglia, Belch, and Cain 1978; Steadman 1969).

Advertising researchers generally deal with nudity and eroticism in a highly "sanitized" context which does not evaluate the possible impact of psychophysiological response to such appeals. The strong erotic stimuli in some advertisements (i.e., nudity and overt sexual content) may produce a physiological arousal response (Belch et. al. 1981) and corresponding negative cognitions (LaTour 1990). Arousal (frequently referred to as activation, energy mobilization, and excitation) is the release of energy into the various internal physiological systems in preparation for overt activity (Duffy 1972). Arousal has been linked to the formation of affective and cognitive responses (Holbrook and Hirshman 1982; Singh and Churchill 1987).

Now recognized in the consumer psychology literature as an important element in the communication process, self-report measures of arousal may provide the key through which the impact of female nudity and erotic communications may be better understood. We propose a model in which multiple dimensions of arousal intervene between exposure to female nudity in an ad and responses to the ad. An experiment, which examines arousal and cognitions toward stimulus advertisements with differing female nudity content, is used as the basis for statistical examination of the arousal model of communication effect. Because of its inherent

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practical and theoretical advantages in advertising research, arousal is measured using Thayer's (1968a) Activation-Deactivation Adjective Checklist (AD-ACL) self-report instrument. A major advantage of establishing a role for arousal in advertising is that considerable research exists associating arousal with information processing, feelings, evaluations, and personality. Thus, a model which incorporates arousal in the assessment of advertising results should develop rapidly.

Erotic Appeals and Marketing Communications

Studies of erotic communication appeals indicate that the effects of such appeals vary; reactions are sometimes positive, sometimes negative (Morrison and Sherman 1972). For example, nudity and erotic content generally increase attention rather than recall or positive affect toward a product (Alexander and Judd 1986; Steadman 1969). There is evidence that the desirable communication effects of erotically based appeals are weakened or turn negative as the levels of nudity or erotism increase (LaTour 1986; Richmond and Hartman 1982). Steadman (1969) found that brand recall was best facilitated by non-sexual illustrations as opposed to sexual ones. Alexander and Judd (1979) found that recall for a male sample was higher for non-sexual ads than for ads using female nudity. Peterson and Kerin's (1977) experiments with various degrees of "clothedness" on models in print ads indicated that ads using explicit nudity were not rated as highly (attitude toward the ad) as were ads featuring fully and partially clothed models.

Alexander and Judd (1986) contend that while sex and female nudity in advertising are neither uniformly liked or disliked, demographic characteristics such as sex, rural-urban location, marital status, and age were related to attitudes toward female nudity in advertising. There is also evidence that responses to erotic communications are individualistic in nature rather than being uniform across audiences (Morrison and Sherman 1972).

Sciglimpaglia, Belch, and Cain (1978) and Belch et al. (1981) found that arousal resulted from erotic ad stimuli, and that resulting affect varied distinctly by gender of the respondent. Specifically, when comparing the reactions of male and female respondents, same-sex-nude-model ads were viewed more negatively while opposite-sex-nude-model ads were viewed more positively.

Although advertisers have intensified the use of erotic appeals in communications, the effects of such appeals are poorly understood and may often be counterproductive.

Seemingly inconsistent arousal responses are often explained with Berlyne's (1960) model of psychophysiological arousal. Berlyne defines arousal as a unidimensional monotonic function extending from calmness and sleep to high levels of emotion and agitation. This function produces the inverted-U responses or reactions identified in the Yerkes and Dodson (1908) hypothesis (Watson and Gatchel 1979; Wundt 1874). Thus, according to this unidimensional model, increasing the level of arousal produces positive responses up to some threshold level; responses become negative beyond that level.

Arousal and Cognitive Response

As a physiological intervening variable in responses to environmental stimuli (Duffy 1972), arousal has been linked to such cognitive processes as the amount of information stored and the manner in which information is processed and interpreted (Bettman 1979; Eysenck 1967; Howard and Sheth 1969; Sanbonmatsu and Kardes 1988; Weiss 1960). Arousal has been shown to affect the formation of affective and cognitive responses (Holbrook and Hirshman 1982; Singh and Churchill 1987). While it affects attitude formation (Thayer 1978a; Weiss 1960) and information processing (Broadbent 1977; Craik and Lockhart 1972; Hansen 1981; Rothchild et al. 1988; Sanbonmatsu and Kardes 1988; Shiffrin and Schneider 1977), arousal also affects the desirability of the ad, the brand, or both (Aaker, Stayman, and Hagerty 1986). Arousal is an important variable in physiological explanations of the multidimensionality of emotion (Daly, Lancee, and Polivy 1983), emotion-laden communication (Batra and Ray 1986), fear (Janis and Feshbach 1953; Ray and Wilkie 1970; Sternthal and Craig 1974) and erotic stimuli (Baker and Churchill 1977; Morrison and Sherman 1972). Sanbonmatsu and Kardes (1988) reported experimental results in which levels of arousal induced by a non-communication stimuli (exercise) interacted with endorser status in a study of brand attitudes. It seems appropriate to summarize that arousal has become a mainstream topic in the advertising and consumer behavior literature.

While some researchers model arousal effects as affecting the amount of capacity available for cognitive tasks (Sanbonmatsu and Kardes 1988), others propose more complex models with arousal as an intervening construct in the stimulus/cognition chain (Eysenck 1976; Thayer 1978b). With any model of arousal effect in advertising communication, a key consideration is specification of the underlying conceptualization of the effects of arousal's components on cognitive responses.

Arousal, Subjective Experiences, and Affective Outcomes

There are two dominant views of the relationships among arousal, subjective experiences, and affective outcomes.

One view maintains that an affective state is a function of arousal and an appropriate subjective feeling (Schacter 1975; Schacter and Singer 1962). Schacter interpreted results from experiments with adrenaline-induced arousal to contend that individuals subjectively label their physiological sensations, thereby producing an affective reaction. He contended that a response requires a subjective cognitive interpretation of those sensations, based on one's knowledge and perception of the stimulus.

Zajonc (1968, 1980) and his colleagues (Morehead and Zajonc 1977; Zajonc and Markus 1984) argue that subjective assessment is not necessary for the formation of emotion. They contend that the reactions of motor, glandular, autonomic, and visceral systems can indicate emotion before subjective assessment occurs (Shiffrin and Schneider 1977; Wilson 1979; Zajonc and Markus 1982).

Probably, arousal has both a direct effect on responses, and an indirect effect moderated by an individual's perceptions and knowledge (Neiss 1988). The present study focuses on how subjective arousal produced by female nudity and erotic content in advertising moderates between such stimuli and cognitive responses.

In the past, the specification and measurement of arousal as a subjective component of the cognitive process was somewhat controversial (Kroeber-Riel 1979; Schacter 1975; Zajonc 1980). Recent developments in the measurement of arousal suggest that its structure and mediating processes are more complex than previously thought and that unidimensional views of arousal are inadequate (Clements, Hafer, and Vermillion 1976; LaTour 1990; Thayer 1978b). Further, the physiological indicators often used to measure arousal may be inadequate given this complexity (Thayer 1978b). Thayer (1978b) contends that physiological indices such as brain wave activity, galvanic skin response, pupil dilation, and heart rate measure different aspects of arousal. He concludes that each of these indices is associated with one or more dimensions of arousal and that subjective expressions of arousal are effective measurement tools. Thus, experiments with univariate models measuring arousal through physiological indices may be biased by the effects of other unmeasured arousal dimensions on the same behavior.

Today it has been clearly established that arousal is multidimensional and that specifying it as a subjective response to physiological phenomena provides a high level of organismic integration in its measurement (Thayer 1978b, 1986). An individual asked to describe momentary activation feelings will use a self-derived summation of information about many concurrently functioning physiological systems. The current physiological orientation incorporates the use of multiple hardware devices to measure somewhat integrated peripheral nervous systems (Kroeber-Riel 1979). The subjective approach allows for perceptual interpretation of generalized arousal via psychological self-report measures (Thayer 1978b). Thayer's (1978b) model and self-report, instrument, with its noted advantages, has been the choice in some recent advertising research (LaTour 1990; LaTour and Pitts 1989).

Dimensionality of Arousal and the Form of Arousal Responses

Thayer (1967, 1970, 1978a, 1978b, 1986) offers a multidimensional model consisting of either two bipolar or four independent arousal dimensions. In his early work,Thayer (1967, 1970) favors the two bipolar dimensions. His later work (1978b, 1986), and that of Purcell (1982), places more emphasis on a four-dimensional interpretation, while not entirely rejecting the earlier view. In particular, Thayer (1978b, 1986) cites a number of studies in which correlations among the four factors constituting these dimensions are not consistent with a bipolar two-dimensional view. LaTour (1990), LaTour and Pitts (1989), Pitts et al. (1985), Singh and Churchill (1987) and Watson and Tellegen (1985) provide further support for the four-dimensional view.

Thayer and his colleagues (Lopes 1971; Moore 1973; Thayer 1967; 1978a, 1978b; Thayer and Carey 1974; Thayer and Moore 1972) contend that a common continuum of physiological activation produces a variety of subjective arousal experiences. Thayer (1967, 1978b, 1986) identifies four subjective factors (see Figure 1). High activation (HA), or tension, includes adjectives such as "tense," "jittery," and "intense." General activation (GA), or energy, includes "energetic," "active," and "full-of-pep." General deactivation (GD), or calmness, includes adjectives such as "calm," "placid," and "at rest." Finally, deactivation sleep (DS) includes "sleepy," "tired," and "drowsy." The two-bipolar-dimensions model combines GA-DS to form dimension A (energy), and combines HA-GD to form dimension B (tension).

Thayer (1978a, 1978b, 1986) cites a number of studies that report the following results. First, for low to moderate levels of stimulus intensity, dimension A, or GA and dimension B or HA generally are positively correlated. At higher levels of intensity, these dimensions or factors are negatively correlated. Second, correlations associated with GD and DS have not received much attention. Generally, GD and DS are not strongly correlated with each other. Often, contrary to the bipolar model, in instances when GA and HA are positively correlated, HA and DS have a significant positive correlation. Thus, while there is a fairly clear understanding of the GA and HA factors, there is some ambiguity regarding GD and DS.

Thayer (1978b, 1986) and Purcell (1982) contend that the form and level of arousal perceived by an individual impacts on cognition with differential results. Again, the clarity of understanding regarding GA and HA, and the ambiguity regarding GD and DS are apparent. Increasing levels of energy (GA or dimension A) produce more positive feelings and evaluations, while high levels of tension (HA or dimension B) produce negative feelings and evaluations. The effects of GD and DS on feelings and evaluations are not reliable. It is our opinion that these factors are associated with other processes, possibly information processing, and are only secondarily related to evaluation.

To preserve information that may be lost in the two-dimensional model, the present study uses the four-dimensional model. As discussed below, in doing so, we are left with considerable theoretical ambiguity regarding the GD and DS dimensions. An advantage of this decision is that it permits a grounded-theory approach which may suggest theoretical extensions based on the empirical results (Glaser and Strauss 1967).

Arousal as an Intervening Variable in Response to Erotic Advertising

In the multidimensional model of arousal and communication posited (see Figure 1), an erotic stimulus may have a direct effect on the four components of subjective arousal: general activation/energy (GA); deactivation-sleep/fatigue (DS); high activation/tension (HA), and general deactivation/calmness (GD) (Thayer 1967, 1978a, 1978b, 1986). Inherent in the model is the concept of individualistic response to arousal-producing stimuli. Since individuals respond uniquely to arousal-producing stimuli (Duffy 1962; Neiss 1988), studies of nudity and erotic advertising must measure *individual* responses to a *range* of stimuli rather than using generalized "levels" of nudity as group treatment stimuli. Because response to stimuli is idiosyncratic, both tension and energy should result from a range of erotic stimuli. Some people will primarily experience tension while others will be energized. Previous evaluations of erotic stimuli reflect this idiosyncracy (Morrison and Sherman 1972), but fail to include arousal as a measured variable.

The model depicts tension resulting in a negative cognitive evaluation of the ad, whereas energy is hypothesized to result in a positive evaluation. Effects mediated through fatigue and calmness are hypothesized, but the directions of the effects are not specified. As noted above, until recently, arousal was modeled as a two-dimensional construct with deactivation sleep (DS) and general deactivation (GD) being the polar opposites of general activation (GA) and high activation (HA), respectively. Therefore, no clear theory has developed regarding the effects of GD and DS, even though more recent studies (Purcell 1982; Thayer 1986) support the four-dimensional structure. Since there are no clear, empirically supported, positive-affect or negative-affect response patterns for general deactivation (calmness) and deactivation sleep (fatigue) (Thayer 1978b), these paths are left open to inductive interpretation following data analysis.

A direct path from erotic stimuli to cognitions concerning the ad is also shown in the model. This path indicates systematic effects other than those mediated by arousal which may be caused by the ad content or its context. Since this path controls for any additional effects not due to arousal, it allows determination of whether arousal moderates the effect of nudity on cognitions (the path is not significant) or mediates the effect (the path is significant). This relationship is left open to inductive evaluation.

The Current Study

Subjects and Procedures. A laboratory experiment utilizing varying levels of female nudity in a print advertisement provided data for the study of the effects of arousal resulting from female nudity. Subjects for the experiment were 202 business majors in an introductory management course at a southern university. Subjects were randomly assigned to one of three treatment groups (see Appendix A for cell counts). Each group viewed two original ads projected on a screen. The first ad shown was a low-stimulus perfume ad (contained no people) shown to disguise the nature of the study. The second ad shown was one of three treatment ads. The three treatment ads contained the same copy and product image as the initial ad, but each was designed to produce a different level of arousal. The low-arousal-producing stimulus (Demure) pictured a fully clothed couple standing apart from each other in a non-suggestive pose, with a perfume bottle superimposed in the corner of the ad.

The object of using a tastefully clothed, demure couple rather than a clothed, single female figure is to reduce the focus on the female form while still retaining the possibility of sensuality. If the ad including the couple produces levels of arousal in subjects of either gender which approach those for the treatments with female nudes, then sensuality rather than female nudity would be a more plausible explanation for the arousal. In any case, the issue is not critical. If the suggestiveness in this treatment is substantially arousing, there will be a conservative bias in the study—a smaller likelihood of finding significant differences in arousal across the treatments.

The other two ads featured lone females in varying degrees of undress. The moderate-stimulus treatment (semi-nude) pictured an apparently nude female model with her breasts and lower abdomen concealed by the perfume bottle image. The high-stimulus treatment (Nude) pictured the same female, with the perfume bottle image moved away from the model, clearly exposing her breasts and lower abdomen. Each ad contained the same single line of copy (Excitement Beyond Imagination). Pictorial portions of the ads were selected from general readership periodicals following focus group discussions to facilitate the selection of ads from a field of choices.

Perfume was selected as the product for the ad treatments to reduce the possibility of arousal being the result of dissonance between the product types and the picture. Perfume has erotic connotations, and ads for the product often contain female nudity; thus, subjects viewing perfume ads would not be surprised by the presence of nudity. The focus of the study was on arousal effects caused by "normal" use of female nudity, regardless of the subject's opinion on its appropriateness. Thus, efforts were made to eliminate the possibility of increasing arousal effects by adding dissonnance from unusual or unexpected use of nudity.

The perfume bottle used in the treatment ads was an existing (unlabeled) commercial product. To evaluate the possibility that actual product impressions influenced current ad impressions, subjects were asked whether they recognized the product. Twenty-three subjects in the treatments recognized the product. These subjects were compared with the rest of the sample. A Kolmogorov-Smirnov test (Winkler and Hays 1975) showed no statistically significant difference ($p < .05$) in ad impressions between the two groups. Therefore, responses of the subjects who recognized the product were pooled with the other responses.

Other Exogenous Factors. Other than nudity, several factors present in this study have been shown to affect arousal or cognitive responses. For example, Giambra and Quilter (1989) observed that women are less aroused than men in a no-memory-demand sensory-vigilance task. Raju (1980) found that age was significantly correlated with individuals' optimum stimulation level. Finally, Petty, Cacioppo, and Schumann (1983) and Gill, Grossbart, and Laczniak (1988) showed that product involvement influences the persuasive effects of various appeals. Although these factors are not of primary interest here, they are included as control variables that could affect either levels of arousal, cognitive responses, or both.

Measurement. An important consideration in the study of arousal in communication is the specification of the physiological event of arousal and its measurement. Thayer's (1978a) 20-item short form of the Activation-Deactivation Adjective Checklist (AD-ACL) is used in this study to measure arousal across four dimensions (see Table 1). In accordance with Thayer (1978b), respondents were asked to respond to these items in terms of how they "felt." This measurement was taken immediately after viewing the ad to allow for a self-report of their arousal state. Each four-point AD-ACL item provided for ranges in response from "definitely feel" to "definitely do not feel." Purcell (1982) and Thayer (1978b) present extensive reviews and studies of the construct validity of the AD-ACL. Additional support for the construct validity of the AD-ACL is shown in its relationship to electrophysiological measures of arousal. Compared to physiological indices such as respiration rate, galvanic skin response, and heart rate, this approach tends to provide a more accurate reflection of *total* body arousal (Clements, Hafer, and Vermillion 1976).

TABLE 1
Study Variables and
Reliability Coefficients

Items	*Cronbach's Alpha*
Activation-Deactivation Check List	
General Activation	0.91
1. Active	
2. Energetic	
3. Vigorous	
4. Lively	
5. Full of pep	
General Deactivation	0.84
1. Placid	
2. Calm	
3. At rest	
4. Still	
5. Quiet	
Deactivation Sleep	0.89
1. Sleepy	
2. Tired	
3. Drowsy	
High Activation	0.84
1. Jittery	
2. Intense	
3. Fearful	
4. Clutched up	
5. Tense	
Ad Cognition	0.70
1. Distinctive	
2. Inappropriate[a]	
3. Interesting	
4. Offensive[a]	

[a]reverse scored

Four items purporting to measure ad impressions were drawn from previous studies (Aaker and Bruzzone 1985; Bello, Pitts, and Etzel 1983). The items were chosen because they had been used as dependent variables to "feelings" scales that are similar to the arousal scales on the AD-ACL. Respondents were asked to respond to these items specifically in terms of their "impressions of the ad." Subjects indicated if they found the ads viewed to be "distinctive," "interesting," "inappropriate," and "offensive" on a 6-point scale. The four items were summed for analysis with the "inappropriate" and "offensive" items reverse scored. Subjects' age, gender, and involvement with the product class (frequency of perfume purchase, frequency of use, and the importance of purchasing perfume) also were measured. Subjects responded to the study instrument after viewing each of the two ads presented to them. While generalizing from these experimental results based on a convenience sample of students is cautioned, this study provides useful insight into the psychophysiological complexities of reactions to female nudity in advertising.

Analysis and Results

An evaluation of the scale items of the AD-ACL for their convergent and discriminant validity in this study shows that with the exception of two items, the four-factor structure is highly consistent with those reported in other studies (see Appendix B). The two items (wide awake, wakeful) did not discriminate well. Thayer (1986) cites similar crossover results for these items. Since the validity of these items is questionable they were dropped from the current analysis.

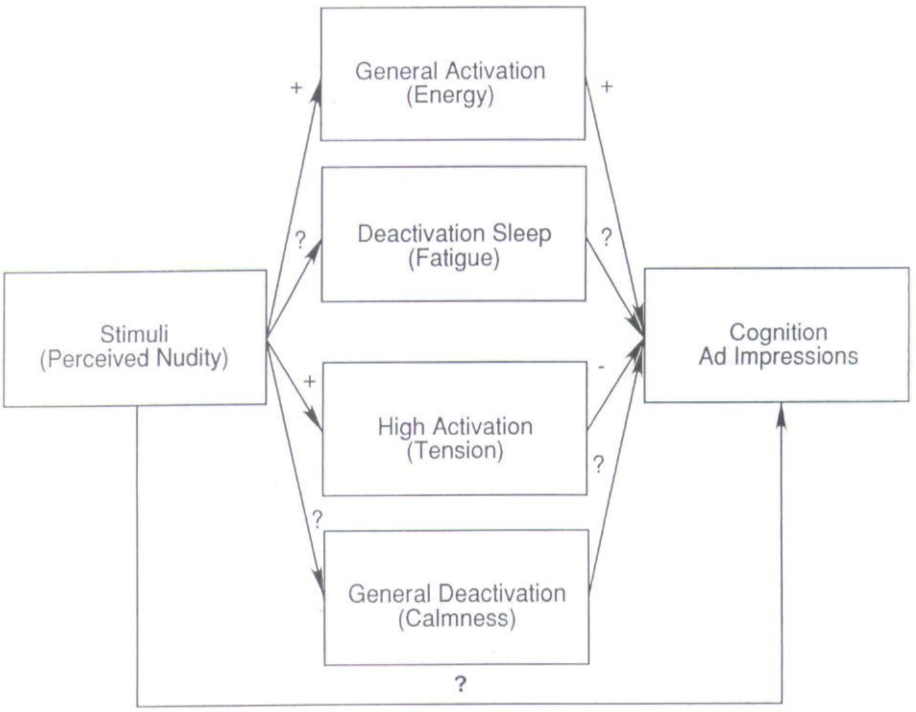
Table 1 shows the coefficient alphas for ad impressions and Thayer's arousal/activation scales. All of the coefficient alpha scores are in excess of .7 and acceptable (Bagozzi 1978).

A single 6-point item measured the perceived nudity in each treatment for a manipulation check. A 2 × 3 (sex by treatment) ANOVA manipulation check clearly indicates the efficacy of the treatments (F = 205.86, df = 2, p < .0001). ANOVAs indicate that all treatment means (nude = 5.14, semi-nude = 2.12, demure = 1.16) are significant at p < .05 and significantly different from each other (p < .05) using Tukey's-HSD multiple-range contrast. As prior research had indicated strong differences in male verses female responses to erotic advertisements (Alexander and Judd 1986; Bello, Pitts, and Etzel 1983; LaTour 1990; Sciglimpaglia, Belch, and Cain 1978), gender was included in the manipulation check analysis. The manipulation check suggests that differences in male and female responses to ads containing female nudity in the present and past studies are not due to differences in how males v. females *perceive* nudity. The effect of the subject's gender on perceived nudity does not have a significant main effect (F = 0.03, df = 1, p > .58), or an interaction effect with treatments (F = 0.69, df = 2, p > .50); i.e. gender does not make a significant difference in the amount of female nudity subjects perceive in the same ad (see Table 2).

TABLE 2
Group × Gender Means on Perceived Nudity

	Demure	*Semi-Nude*	*Nude*
Male	1.21	2.10	5.00
Female	1.06	2.20	5.33

FIGURE 1
Hypothetical Model of Arousal as an Intervening Variable in Marketing Communications



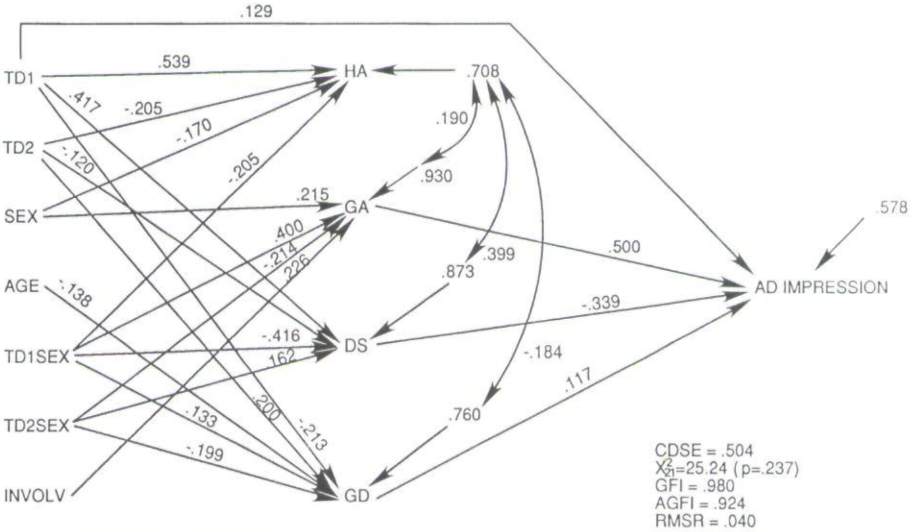
The intervening multi-dimensional arousal effects indicated in the model were examined through the application of path analysis. This analytical method permits separating the direct effects of the advertisements on ad impressions from indirect effects on impressions through advertisement effect on arousal. Several factors in the ads, such as the presence of perfume, the copy, the presence of a couple in one ad, female nudity, and even differences in the mix of colors may have a direct effect on ad impressions. This analysis will overstate the *amount* of arousal caused by female nudity to the extent that any factors in the ad, other than differences in female nudity, directly affect arousal. However, the model will determine whether any factors associated with the ad, including female nudity, have an effect on ad impressions independent of arousal. Also, if references to perfume are arousing, this bias will be constant across all treatments, since all treatment ads deal with perfume. Thus, it is reasonable to assume that the major *differences* in arousal between ads is due to female nudity, particularly between the semi-nude and nude treatments.

The hypothesized path model shown in Figure 1 is evaluated using manifest variables and full-information maximum-likelihood estimates of the path coefficients. Treatment and gender variables are the coded effects (Pedhazur 1982). This coding method leads to a specific interpretation of the path coefficients from these variables. If the path from the effects-coded variable is the only path associated with a dependent variable, the path coefficient is the difference between a group's mean and the unweighted grand mean. When an effects variable and a continuous variable both predict the same dependent variable, the path coefficient for the effects variable is an intercept. This intercept coefficient is equivalent to an effect in analysis of co-variance. It represents the effect of the independent variable on the dependent variable when the effects of the associated variables are zero.

Treatment-by-gender-interaction effects-coded variables are added to the hypothesized model based on the results of preliminary ANOVA analyses in which the interaction was significant. These paths can be interpreted in the same way as the other effects-coded variables in the model.

Considerable work indicates that dimensions in the AD-ACL are correlated (Thayer 1978b, 1986). Although

FIGURE 2
Final Path Results



the four scales often are treated as pairs of polar opposites on two dimensions (Thayer 1978b), other studies, including the present one, find correlation patterns that do not support the two-dimension interpretation (Pitts et al. 1985; Purcell 1982).

The possibility of significant correlations among the four arousal dimensions is included in the present model. Correlations significant at $p = .05$ are indicated by the arcs connecting the error terms. Two possibilities occur if significant correlations are not included in the model. First, the fit of the model will be reduced to the extent that it does not accurately reflect the empirical relationships. Second, and more important, interpretation of the model will be biased because the correlations will be absorbed into the parameter estimates for the paths from the dimensions of arousal to ad impressions. Depending on the pattern and size of the correlations, the bias could substantially alter the theoretical meaning of the results.

The model reported in Figure 2 contains paths and correlations significant at less than the .05 level. The fit for the model ($\chi^2 = 25.24$, $df = 21$) was compared to the fit for a null model ($\chi^2 = 166.76$, $df = 39$) in which none of the paths are assumed significant (Bentler and Bonett 1980). The difference ($\chi^2 = 141.52$, $df = 18$) is statistically significant ($p < .01$) indicating further interpretation of the model is warranted.

As expected, arousal has a substantial intervening effect in the relationship between nudity and ad impressions. All of the exogenous variables have either direct or indirect effects on ad impressions.

Exogenous Variables Effects. The primary main effects of high levels of nudity are on arousal, increasing tension (TD1-HA .539) and fatigue (TD1-DS .417), and decreasing calmness (TD1-GD −.213). There is also a moderate direct main effect of high nudity on ad impression (TD1-AD .129), indicating that arousal was a mediating, rather than a moderating, construct. The semi-nude condition, represented by TD2 paths, has approximately the opposite effects of high nudity: less tension (TD2-HA −.205), less fatigue (TD2-DS −.120), and more calmness (TD2-GD .200). These estimates have a particular interpretation as effects-coded variables. They are intercept coefficients showing departures from the unweighted grand mean after adjusting the effects of the other variables influencing the same arousal dimension to zero. For example, the difference between the nude and demure treatments on tension (TD1-HA) has an intercept of .539 above the adjusted mean, while the difference between the semi-nude and demure treatments on tension (TD2-HA) has an intercept of −.205 below the adjusted mean. The value of this approach is that it clearly shows the magnitude of the differences between adjusted effects in the present study.

Based on the results associating female nudity with arousal, there appears to be little advantage to using a four-dimensional model of arousal. As predicted by the two-dimensional model, tension (HA) increases while calmness (GD) decreases. Also, it is consistent with the two-dimensional model that the covariance between tension and fatigue is positive, assuming that the covariance between energy and fatigue is negative, which it is (−.125), although it is not statistically significant. The two-dimensional view is further supported by the treatment-by-gender-interaction paths (e.g., for TDISex, tension decreases while calmness increases, and energy increases while fatigue decreases.) In favoring the two-dimensional view, this discussion ignores the endogenous relationships discussed below.

Gender has a significant effect on arousal, apart from its interaction with the treatment in the present study. Males express less tension (Sex-HA −.170), and more energy (Sex-GA .215) than females. The treatment-by-gender interactions show that under the condition of high nudity, males feel less tension than females (TD1Sex-HA −.205), more energy (TD1Sex-GA .400), less fatigue (TD1Sex-DS −.416), and more calmness (TD1Sex-GD .133). The semi-nude treatment interaction with gender represented by TD2Sex has approximately the opposite effects. The path to tension is not significant; however, energy (TD2Sex-GA −.214) and calmness (TD2Sex-GD −.199) are reduced, and fatigue (TD2Sex-DS .162) is increased more for males than for females.

Product involvement has an interesting impact on general activation

(GA). After setting the effects of gender and treatment-by-gender interactions to zero, product involvement has a significant effect on GA (Involv-GA .226). That is, all of those who claim involvement with the product, whether male or female, express more energetic arousal in all of the treatments. A similar effect appears for age, with older subjects reporting less calmness (AGE-GD −.138).

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Endogenous Variable Effects. Consistent with previous findings, energy has a direct, positive association with ad impression (GA-AD .500). Thayer (1986) notes that the relationships between calmness and fatigue as independent variables, and various dependent variables do not show any consistent relationships. In the present study, calmness has a direct positive effect on ad impressions (GD-AD .117), and fatigue has a direct negative effect (DS-AD −.339).

Previous theoretical arguments and empirical evidence (Thayer 1978b) failed to point to clear expectations for the calmness-ad impressions (GD-AD) path. While general deactivation (GD) operates as one of four factors in this study, it is linked theoretically to tension (HA) as a polar opposite in Thayer's (1986) dimension B (Tension-Calmness). Thus, as an opposite of HA, the positive GD-AD path is consistent with many studies that report negative outcome responses for tension (HA) (Thayer 1978a,1986; Purcell 1982).

In terms of the fatigue-ad impression (DS-AD) coefficient, Thayer (1986) concluded in his review that tension usually has a negative correlation with outcome assessments, and that the relationship between DS and outcome assessments is unclear. In the present study, the HA-AD path is not significant and the DS-AD (−.339) path has a fairly large significant effect. The difference in results can be explained by differences in model assumptions. Thayer's (1986) studies either model arousal as two bipolar dimensions or as four independent dimensions. The present study finds a significant positive correlation (.399) between the HA and DS error terms. Thus, instead of forcing the correlation variance to appear as two variables (HA and DS) with significant paths (correlated with) to a third (AD), the two are shown as correlated with each other and having one significant path to AD. The differences in model assumptions is further illustrated in the present study. A significant first-order negative HA-AD Pearson correlation $r = -.14$ ($p < .05$) (not shown in Figure 2) is consistent with Thayer's interpretation, and supports our conclusion that different assumptions in the present model would produce a significant negative HA-AD path.

The results associating the endogenous variables with each other and with outcome assessments demonstrate the value of the four-dimensional model. Consistent with the two-dimensional bipolar model, Figure 2 shows a negative correlation (curved arrow) between tension and calmness, (HA and GD) (−.184). Also, while energy (GA) has a positive relationship with positive ad impressions (.500), fatigue (DS) has a negative relationship (−.339).

However, several results are not consistent with the two-dimensional model. First, there is a large positive correlation between tension and fatigue (HA and DS) (.399), which should not be the case when the correlation between tension and energy (HA and GA) is positive as it is here (.190). Second, both energy (GA) (.500) and calmness (GD) (.117) increase positive ad impressions, which we would expect to occur only if the correlation between energy and tension (GA and HA) was large and negative; the correlation is positive (.190). Third, the absolute value of the correlation between tension and fatigue (HA and DS) (.399) is more than twice the absolute value of the correlation between tension and calmness (HA and GD) (−.184), its presumed polar opposite.

Finally, as a result of the noted inconsistencies, a two-dimensional solution not included here had a poorer overall goodness-of-fit, and implied a more important role for (HA) as part of dimension B than is implied by the correlation between tension and calmness (HA and GD) shown in Figure 2. Figure 2 shows a very strong effect of female nudity increasing HA (TD1-HA = .539) which is dissipated by other factors to the point that its total effect on ad impressions is not significant. Thus, the four-dimensional model provides information that is not readily apparent in the two-dimensional model.

The present analytical approach examines a process by which nudity in print ads affects ad impressions through arousal. The path coefficients show the significant sequential relationships indicating the direct effect a variable has on a subsequent variable. However, the overall "net" effect a variable has on ad impressions is also important. Indirect and total-effects coefficients aid in understanding these overall effects. Indirect effects are the product of the parameter estimates along all of the paths from the variable of interest through intervening variables to a dependent variable. The total effects of a variable are the sum of its direct and indirect effects on a dependent variable. Thus, if either a direct or an indirect effect is zero, total effects will equal the non-zero effect. Table 3 shows all of the total and indirect effects on ad impressions that are at least twice their standard error. The estimate divided by the standard error is normally distributed. Therefore, two times the standard error is equivalent to a Z statistic with approximately an alpha = .05. Significant indirect effects that are equal to the total effect are not included in the table.

TABLE 3

Indirect and Total Effects on Ad Impressions[1]

	Coefficients	*Standard Error*	
Significant Total Effects			
SEX	.107	.054	Stability
TD1SEX	.356	.056	Index[2]
TD2SEX	.185	.050	.378
INVOLV	.113	.053	
TD2	.064	.029	
GA	.500	.055	
DS	−.339	.058	
GD	.117	.055	
Significant Indirect Effects			
TD1	−.166	.037	

[1] Total and indirect effects on ad impressions shown are at least twice their standard error.

[2] The stability index should be less than one for a sufficient condition for convergence (see K. G. Joreskog and D. Sorbam (1988, p. 35).

The arousal dimensions energy, fatigue, and calmness (GA, DS, and GD, respectively) are the primary factors affecting ad impressions either directly or indirectly. Of the exogenous variables, gender and gender-by-treatment interactions have sizable total effects on ad impressions. Interestingly, the total effect of high nudity ($\text{TD1-AD}_{\text{tot.}} = .037$ (S.E. = .061)) is clearly not significant. The significant positive direct path (TD1-AD = .129 (S.E. = .059)) is offset by a significant negative indirect effect ($\text{TD1-AD}_{\text{indr.}} = -.166$ (S.E. = .037)) through its interaction with gender, and its effects on arousal. This canceling effect indicates that female nudity will have little net effect on ad cognition if the scores are totaled for an audience made up of almost-equal numbers of males and females.

Limitations of the Study

This study was limited by several factors. First the use of undergraduate students, while appropriate for the product category (perfume), was nevertheless a convenience sample. The inclusion of males was thought appropriate in light of the fact that men buy perfume as a gift for women, and perfume is occasionally advertised in magazines with primarily male readership (e.g., *Playboy*). Within our sample, 20 percent of the males indicated they regularly buy perfume at least once per year. The average number of yearly perfume purchases for males in this sample is .47 with a standard deviation of 1.6 purchases per year. This is congruent with the *Simmons 1988 Study of Media and Markets* which indicates that more than 17 percent of males surveyed bought perfume as a gift within the previous year. Considering this information, males readily qualify as potential perfume purchasers.

A second limitation is the fact that while respondents were physically separated from each other, and did not communicate with each other during the treatment, they were exposed to the ad on a projection screen rather than in a print medium. Third, by ethical necessity, students were told beforehand that they were volunteering for a test of print ads to be projected on the screen. Naturally, by limiting the stimuli of focus to print ads, the effects of erotic stimuli in other media on arousal dimensions remains to be studied. Fourth, since each respondent saw only two ads, one a serene landscape (in order to disguise the purpose of the study), followed by one of the three treatment ads, no random ordering of the ads was feasible. Fifth, it might be argued that overt nudity is not common in American advertising. Recent research by Soley and Reid (1988) indicates the use of overt nudity, while still not as common as other forms of suggestive appeals, has nonetheless increased significantly over the last few decades. Sixth, the selection of the ad-impression items, as is the case in much social science research, is based only on precedent (past use in similar studies) and face validity. Future research exploring the nuances of ad impressions resulting from arousal, and associated measurement issues, is warranted.

Finally, while the exogeneous variables included in the model (age, gender, involvement) have been justified based on theoretical precedent, additional variables such as sexual values, or role orientation (see Sciglimpaglia, Belch, and Cain 1978) could have an impact on arousal and ad impressions.

The full role of arousal in marketing communications must be established in future studies which evaluate the effects of a wide variety of stimuli in various media and compare the results to other explanations.

Discussion

As advertisers struggle to capture the attention of potential customers in the midst of tremendous media clutter (Engel, Blackwell, and Minard 1986, p. 196), emphasis on the use of female nudity in advertising increases (Soley and Reid 1988). "Madison Avenue" is being assailed by renowned activists such as Jean Kilbourne, who in the 1987 Cambridge Documentary film "Still Killing Us Softly" denounces the continued portrayal of women as sex objects (also see Kilbourne 1982). Previous empirical studies indicate that female nudity affects people in diverse ways, and quite often negatively (LaTour 1990; Sciglimpaglia, Belch, and Cain 1978). Certainly a great deal of controversy surrounds the use of female nudity in advertising.

We have demonstrated that arousal can be an important mediating variable in the effects of female nudity and the advertising context on ad impressions. Arousal not only absorbs much of the effect of female nudity, age, and gender on ad impressions, but also the effects of complex interactions among these variables. The difference between the nude and demure ads had a modest direct effect on ad impressions.

Our study shows that rather than simply attempting to evaluate levels of nudity, research focus should shift towards effects on multiple dimensions of arousal. Specifically, general activation (energy) appears to be a very desirable response to an ad stimulus. The findings of this study support Thayer's (1978b) contention that stimulation of energy (GA) leads to positive cognitions. The output relationship from general deactivation (calmness) to cognitive ad impressions fits with Thayer's (1978b) contention that feelings of calm connote an absence of tension and may account for this positive path. Alternatively, the general deactivation-ad impression relationship may be the result of variables such as information processing that are not included in the present study.

In our study, tension (HA) was not shown to have a direct influence on ad impressions. Of course, one plausible explanation is that the explicit nudity in the print advertising medium did not elicit sufficient tension to have a direct effect. Perhaps this indicates a need for further empirical research to explore the range of possible tension response from print ads. However, we support an alternative view. Specifically, we feel that the lack of a significant tension-ad impression path here is not a major concern, since the arousal dimensions are correlated through the error terms. This simply indicates that the effects of tension are being absorbed by the other dimensions through the correlations and other paths; that is, Thayer's (1986) contention that higher levels of tension are accompanied by fatigue appears to hold in this study. If another arousal-ad impression path was fixed to zero, the HA-AD path would become significant and negative.

The study provides some support for viewing arousal measured by the AD-ACL as a four-dimensional model. It also illustrates the need for additional theoretical development. In particular, a better understanding of the roles of calmness and fatigue (GD and DS) is required. If they are not the polar opposites of tension and energy (HA and GA) as suggested here, we must establish how their effects on ad impressions are different. This will require expanding the present model. The initial keys to successful expansion will be found in those variables that are associated both with arousal and with desired marketing outcomes such as ad impressions, buying intentions, and actual purchases.

The significant calmness-ad impression (GD-AD) (.177) path, along with the significance of the fatigue-ad impression (DS-AD) path ($-.339$) previously discussed, suggests that additional theoretical development is required. The pattern of correlations among the four arousal variables does not support the two bipolar dimensions suggested by Thayer's early work (1978b). Future research may need to focus on calmness and fatigue (GD and DS) as independent factors affecting human information processing. For example, while the present experiment cannot answer such an issue, one explanation may be that tension and energy (HA and GA) have more to do with direct ad impressions, while fatigue and calmness (DS and GD) have more to do with human information processing. That is, GD and DS may have a more direct effect on how many features of the ad will be perceived and recalled and how much sense-making occurs regarding the meaning of those features, and may only indirectly influence impressions. If this is the case, then the correlations between HA and GD and DS suggest that higher levels of tension increase the focus on aversive elements in the ad and on negative interpretations of those elements.

The most important key to predicting ad impressions in this study is knowledge of the subject's arousal state. The inclusion of gender, age, and product involvement along with female nudity allows us to assess the relative effects of female nudity and its interactions with these other variables on arousal and ad impressions. The results corroborated Sciglimpaglia, Belch, and Cain (1978) by suggesting that the use of female nudity in perfume ads is significantly less effective for females than for males in the present study. More importantly, we get a picture of how these factors act in conjunction with each other in the impression process.

In applied research using arousal, studies need to evaluate how sensitive the AD-ACL is to various elements of advertising stimuli and how sensitive the dependent variables in marketing are to differences in arousal. For example, studies may explore the impact of male and mixed-gender nudity on ad impressions and buying intentions (e.g., Calvin Klein's "Obsession" advertisements). Other ad elements (e.g., color, focus, framing), context factors (e.g., placement of the ad, time of exposure, number and frequency of exposure), and subjects' demographic and psychographic characteristics require evaluation. Many of these factors have been related to arousal in other research contexts, but will require evaluation in advertising.

Finally, it is important to incorporate a psychophysiological model of differing reactions to erotic ads within the overall promotional strategy of the firm involved. While attracting attention to an advertisement is of primary strategic importance, "over-doing" the use of nudity may result in detrimental consequences for the product in question.

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APPENDIX A
Cell Counts

	Male	*Female*
Nude	30	40
Semi-Nude	25	39
Demure	31	37

Mean Age = 20.98
Standard Deviation = 3.17
Range 19-47

APPENDIX B
Factor Analysis Using Varimax Rotation for the Treatment Ad Activation Indicators

	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*
energetic	.86856	.10670	−.08482	−.9003
vigorous	.83131	.10360	−.08921	−.04582
full of pep	.82151	.10524	−.14259	.00966
lively	.81419	.05648	−.14512	−.15700
active	.78204	.05739	−.22385	−.12395
fearful	−.03014	.84076	−.06386	.15817
tense	.05795	.83351	−.11603	.13214
clutched up	.00268	.81395	−.11770	.12932
jittery	.13812	.78312	−.16688	.16495
intense	.36312	.60540	−.06625	−.04728
calm	−.1220	−.15585	.82139	.11476
at rest	.01600	−.14315	.80532	.07263
still	−.28240	−.12170	.76713	.14109
quiet	−.07205	−.09899	.76154	.18698
placid	−.10776	−.01475	.64543	.05092
tired	−.19488	.21121	.14291	.87493
drowsy	−.20496	.20713	.18152	.84215
sleepy	−.22205	.15852	.26173	.80140
wakeful[a]	−.71923	−.07505	.04778	.15985
wide awake[a]	−.71427	.04818	−.02337	.23573

	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*[b]
Eigenvalues	6.183	3.817	2.643	1.062	.768
% of Variance Explained	30.9	19.1	13.2	5.3	3.8

[a] reverse scored

[b] per scree plot. Since Eigenvalue was less than 1, only four factors were computed.

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